



# Squadron 5 News



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## THE COMMANDER'S CORNER

By Capt Jon L. Stokes

### "Homeland Security – Returning to the Past to See Our Future"

On the morning of September 11, 2001, everything changed. Our consciousness as Americans, our perception of our vulnerability as a nation and our mission within Civil Air Patrol all changed. Starting with those first reconnaissance flights of a CAP aircraft over "Ground Zero," CAP became one of the leaders in defending our homeland in the post 9/11 world and in the five years that have followed, the new Department of Homeland Security and the Department of Defense once again called upon CAP to help in protecting our country as we did following the attack on Pearl Harbor. In addition to our existing Emergency Services role, all aircrews must adapt how we approach our missions and become proficient in the new roles and technologies that we have been tasked with.

Shortly after 9/11, CAP became involved in aerial reconnaissance imaging and transmission where photos were taken from the air via digital cameras and transmitted to the ground via existing CAP radio frequencies. Although the premise was promising, the technology proved too slow and unreliable. CAP, capitalizing on emerging digital and satellite technology, developed a new technology called Satellite Digital Imaging System or SDIS. This technology utilizes "off-the-shelf" digital cameras, laptops computers and satellite telephones to allow digital photographs to be taken, processed and transmitted anywhere in the world via satellite telephones and email. Since CAP can operate at a cost substantially lower than other responders, we have been and will continue to be called upon to employ this near real-time reconnaissance option.

The new Airborne Real-Time Cueing Hyperspectral Enhanced Reconnaissance or ARCHER system is a more advanced specialized reconnaissance system that marries advanced electronics, powerful computers and optics. The airborne system is designed to scan the ground for the unique reflected light signature of a specific object. That object could be a downed aircraft, a vehicle or certain shade of foliage. The objects that the system can detect have color frequencies beyond the limits of human eyesight and can detect a target as small as a meter from as high as 10,000 feet.

As of late, more and more emphasis is being placed on the security of our border between the United States and Mexico, both from incursion on the ground and in the air and CAP has missions to address both. For years, CAP has assisted the Drug Enforcement Agency (DEA) in detecting those attempting to cross the border smuggling drugs. These missions are continuing as we continue to be called to fly counterdrug flights. As of late, CAP is being called to simulate airborne border incursions to assist Department of Immigration and Customs Enforcement (ICE) and Air Force aircrews in training airborne interception techniques.

What does this all mean for Squadron 5? It means that CAP's role is changing and if we wish to continue to be at the forefront of readiness to perform Missions for America, we must begin training for these missions. In the months to come, I will be asking Operations Officer Jerry Jones, Emergency Services Officer Mark Robinson, Counterdrug/HLS Officer Jon Meyer and Training Officer Roger Mann to develop a training program that will help our squadron prepare to do our part in to defending our country. Between now and then, continue to keep yourself current in your training to achieve your aircrew ratings.

Thanks you for everything you do.

# READY FOR ANY EMERGENCY



## Emergency Services Training

by 1st Lt. Roger Mann

As an Emergency Service Squadron we have a responsibility to the public to save lives and relieve human suffering. Those of us in Squadron 5 have a unique roll in our society to serve our community in a very meaningful way.

Many organizations exist for many reasons. Some people support community projects, work with the homeless, work with youth (such as the CAP Cadet Program) so that this nation will have a strong future. All of these good organizations serve the community well.

But how do you describe "Emergency Services" in CAP. The word "Emergency" says a lot. Obviously it involves emergency type situations. Usually when we think "emergency" we think Fire Departments, Ambulance services, Forest Fire Air Tankers, Police, and Disaster Teams in earthquakes and floods and many other professional type organizations.

Where do we fall in the "big picture" of "emergency services"? Are we just a "club" that meets once a week to talk about what we accomplished last week? Do we fly airplanes in CAP to just serve our own desires? I think most of us would answer "NO".

Under Disaster Relief Operations, CAP has participated in many situations

across the nation that have in some way involved each these types of disasters. What makes CAP even more unique in the emergency world is that we are a totally volunteer organization that is on call for any disaster that may occur at any time or place just as a fire department is always ready roll to save lives and property. Most other emergency services are composed of at least a core of paid professionals. Additionally, CAP has earned the privilege as a volunteer organization to participate in saving lives where other volunteer clubs or organizations are asked to leave or evacuate. This I believe is what brings quality to CAP - a volunteer WANTS to be



CAP ready to serve at Imperial

there.

I haven't even touched on Search and Rescue. We in Squadron 5 are very aware of our roll in this obviously critical Emergency Service.

The word "Services" is wrapped up in the following. The primary mission of Emergency Services is to save lives and relieve human suffering. You can't expound on that.

Our association with the United States Air Force has given us the privilege to be part of this vital roll as an "Emergency Service" and to work along side paid emergency professionals.



MARB Cadets train on Direction Finding while waiting their turn for O-Rides



Mark Robinson trains Jerry Mohr, Craig Gallagher and Jim Daley in the fine art of using the hand DF unit.

# Operational Activities Summary

## OPERATIONS

by Lt. Col. Jerry Jones



Lt Col Jones & Lt Col Pearce brief MARB Cadets

**17-Mar-06** B o b Pearce and Jerry Mohr launched on an ELT in the Pear Blossom Area. The ground time located the crashed C 172 before they arrived in the area. They were then diverted to Long Beach on an ELT mission, which ceased transmitting, before they arrived.

**25-Mar-06** B o b Pearce and Jerry Jones

conducted orientation rides for six Squadron 45(MARB) cadets at Riverside Airport.

**25-Mar-06** Mark Robinson conducted training on ground DF procedures for members of Squadron 5. Those attending were Bud Scanlon, Craig Gallagher, Jim Daley and Jerry Mohr.

**27-Mar-06** Craig Gallagher flew orientation flights for two ROTC cadets from CSUSB.

**31-Mar-06** J e r r y Jones flew an orientation flight for a ROTC cadet from CSUSB.

**2-Apr-06** J e r r y Jones and Roy Knight flew a WADS mission for which they received raves and much praise. The intercepting aircraft flew down the runway in salute after they landed. See following photo.

**8-Apr-06** D o n Springer, Bob Pearce and Claus Heisman of Sqd 59 flew orientation flights for CAP cadets at Victorville.

**15-Apr-06** Mark Robinson conducted ELT ground training, Squadron Members participating were Craig Gallagher, Jerry Mohr and Bud Scanlon.

**12-14-May-06** Lonn Olfert and Jim Sanders participated in CN missions at Imperial in CAPFLT 453.

**27-May-06** C r a i g Gallagher flew orientation

flights for two ROTC cadets from CSUSB.

**30-May-06** Craig Gallagher, Jon Stokes and Michael Graham flew a Distress Beacon mission in the Cajon Pass area. The beacon was Df'd to Rialto airport and the mission was turned over to a ground team. Crewmembers received credit for a non-distress find.

**02-Jun-06** The Squadron participated in the annual CAWG evaluated SAREX. Craig Gallagher was tasked with a mission to transport an OES staff member from Los Alimitos to Cable airport.

**10-Jun-06** J e r r y Jones and Don Springer flew Orientation flights for CAP cadets at Rialto.

**17-Jun-06** D o n Springer participated in Cap cadet orientation flights for Squadron 59 at Hemet.

### CHECKOUTS

Bud Scanlon completed his training as Mission Scanner. Congratulations Bud.

### FORM 5 FLIGHT CHECKS

The following squadron personnel completed their annual flight checks this quarter:

Garry Brown, Roy Knight, Lonn Olfert, Mark Robinson and Don Springer.

**Congratulations to all.**



WADS Interceptor — 2 April 06

# Humidity and Air Density



## SAFETY

Most people who haven't studied physics or chemistry find it hard to believe that humid air is lighter, or less dense, than dry air. How can the air be lighter if it has water in it which is heavier than air?

The first thing we need to remember is that there is a difference between liquid water and water vapor, which is a gas. Then we need to apply Avogadro's Law which states that a fixed volume of gas will always contain the same number of molecules, no matter what the gas is.

Dry air is composed of about 78% nitrogen and 21% oxygen plus a 1% mixture of other gases which we will ignore in this example. Each nitrogen molecule has a molecular weight of 28 ( $N_2$  at 14 atomic weight each) and each oxygen molecule has a molecular weight of 32

( $O_2$  at 16 atomic weight each). When air becomes humid, a percentage of the nitrogen and oxygen molecules are replaced by water vapor ( $H_2O$ ) which has a molecular weight of 18 ( $H_2$  with an atomic weight of 1 each and O with an atomic weight of 16). As you can see, the higher the humidity in the air, the lower the density becomes and therefore the less air that is delivered to the engine and the lower density reduces the support toward the wings and propellers have less to push against. That is what is important to pilots.

Ever since the days we were in ground school we have been taught what effect density altitude has on aircraft performance. Hopefully we became aware of the fact that when density altitude increases, engine performance, thrust and lift decrease and takeoff and landing distance increase. Do you remember the factors that affect density altitude? They are pressure altitude, temperature and relative humidity. Even though all pilots are taught this, every year we see accidents which have density altitude as a contributing cause.

Fundamental aviation training references characterize the density of the air as a function of pressure, temperature and humidity. Procedures exist for computing pressure and temperature deviations from standard conditions. Pressure deviations are cor-

rected by calculating pressure altitude. Temperature deviations are corrected by calculating density altitude. However, humidity corrections are not so readily available.

There are a couple of generalities we can remember:

1. When humidity is present, the apparent altitude to the aircraft increases.
2. As humidity approaches zero, the humidity effect approaches zero.

But we need more than just generalities to assure our safety. There are humidity graphs available on the internet that graphically show what the humidity correction, in feet of altitude, will be, but a more accurate correction can be achieved using the sophisticated humidity correction calculators that are also available on the internet. (One found at [http://wahiduddin.net/calc/calc\\_da\\_rh.htm](http://wahiduddin.net/calc/calc_da_rh.htm) is shown at left).

Once we have the correction we can apply it in one of two ways, we can add the altitude to the density altitude or we can add it to the pressure altitude.

Although one example of a density altitude calculator which adjusts for humidity is shown, there are many more, each will provide a slightly different approach to the problem. Type in "Humidity and Air Density" on your web browser and you will find one to suite your needs.

### Density Altitude Calculator

|                   |                      |           |
|-------------------|----------------------|-----------|
| Altitude          | <input type="text"/> | feet      |
| Air Temperature   | <input type="text"/> | degrees F |
| Altimeter Setting | <input type="text"/> | inches Hg |
| Relative Humidity | <input type="text"/> | %         |
| Density Altitude  | <input type="text"/> | feet      |
| Absolute Pressure | <input type="text"/> | inches Hg |
| Relative Density  | <input type="text"/> | %         |

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# GPS – WAAS & LAAS



***WAAS capable receivers will provide all airports with the capability to have IFR approaches.***

## Aerospace Education

This quarter's newsletter Aerospace Education topic will introduce the Global Positioning System (GPS), Wide Area Augmentation System (WAAS). GPS WAAS capable receivers will provide the capability for virtually all airports in the US that currently don't have IFR approaches to have one. Local Area Augmentation System (LAAS) will provide category II approaches to a select airports. In general, the following information applies to both with some exception for LAAS to be covered during our next AE meeting.

As I discussed during the first GPS AE presentation, GPS has its limitations and pitfalls. It was said when we were evaluating GPS for USAF instrument approaches that current GPS, without any aiding or augmentation, can produce an accuracy good for category I approach if we only used

the horizontal accuracy. However, vertical accuracy was good for maybe category "½". The lower accuracy in the vertical axis is due to satellite geometry and errors inherent in GPS. Therefore, key among the pitfalls are; a) its lower vertical accuracy, b) it's the lack of integrity monitoring (extremely important) and, c) GPS errors that affect all axis.

What is integrity monitoring, you ask? At the end of every localizer, ILS, etc., there is a monitoring unit that its independent of the unit its self and if the signal from the ILS or localizer has an error of a predetermined amount, the monitor will pull the plug on the unit, so you won't hear the ID and will cutoff the signal in order to display the INOP flag on the instruments. The amount of allowable error and the how quick the monitor has to react is a

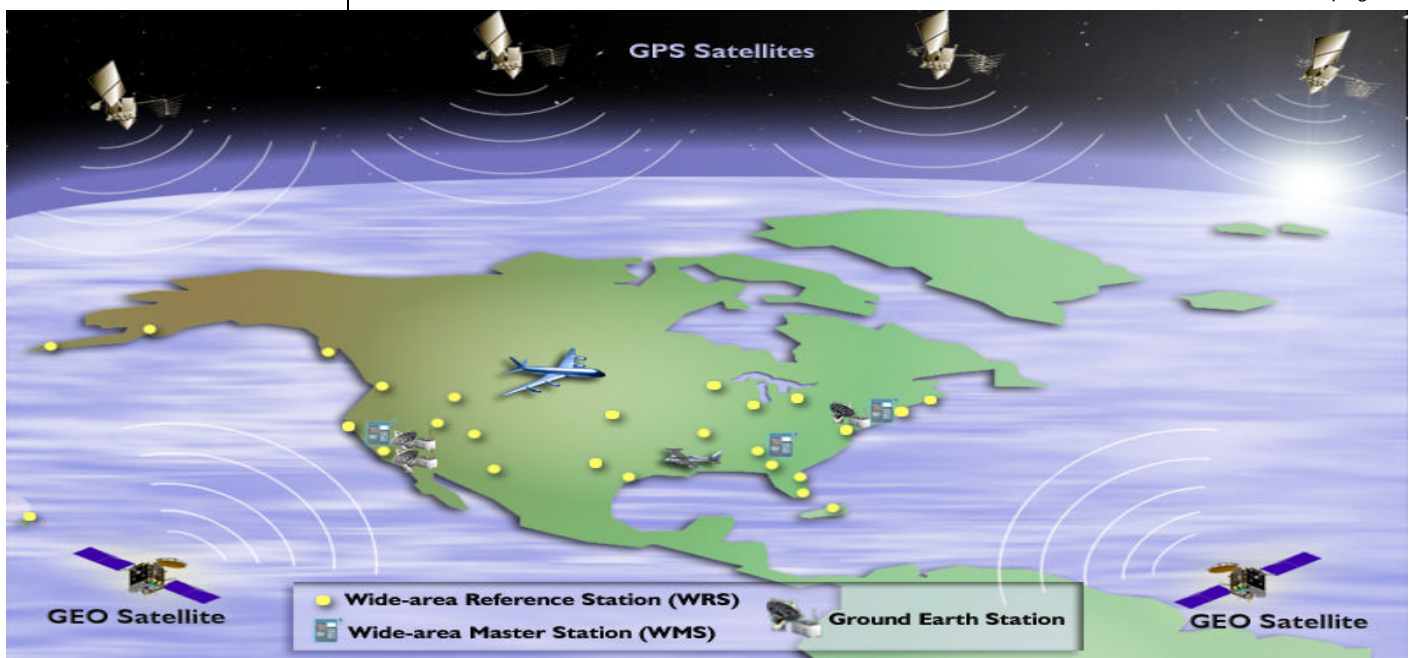
by SM Joe Alverio

function of the precision of a NAVAID. A TACAN approach may have to react and report an out of tolerance condition or failure in less than 7-10 seconds, while a category III ILS has to be in less time.

The US Air Force, due to a number of reasons, provided military accuracy, and a good non-precision approach capability, but somehow forgot about integrity monitoring. This omission affected the military GPS IFR operations and made it worst for the civilian users since DoD could degrade the signal and the FAA had no control of it.

Before WAAS, it could take up to 45 minutes for the US Air Force Space Command to detect a satellite malfunction and to change the GPS download message to report a problem with a given satellite. The

*continued on page 7*



# Squadron 5 Dining Out - 2006

by Capt. Jim Daley



*Major George Holder  
honors our missing  
brethren.*

Squadron 5 commander Capt. Jon Stokes presided over the squadron's 2006 Dining Out at March Air



**Capt. Stokes presides  
over the mess**

Museum on June 17, 2006. The Museum made a perfect backdrop for the Dining Out which recognizes the volunteers of Squadron 5 for their contributions throughout the



**Navy Captain Bob  
Pearce visits the Grog  
Bowl**

past year.

The evening began with a social time as the members of the unit had one of the rare opportunities to visit with family members who stay behind the scenes but without whose support the functions of Civil Air Patrol could not

exist.

It was then time to toast the United States, the President, and all those in the chain of command who defend this great country and guide CAP. As usual, the fun began with the establishment of the rules of the mess and the corresponding penalty for violating those rules—a trip to the grog bowl. Lt. Col. (Navy Captain) Bob Pearce was Vice for the evening and was tripped up for the first visit to the grog bowl. He quickly ensured that he had company at that location!

Following a wonderful dinner of beef, chicken and vegetarian lasagna the 2006 Squadron Awards were presented. (See page 8 for a listing of the awards.)

The speaker for the evening was Chuck Austin, a former Guard at the Tomb of the Unknown Soldier. Mr. Austin spoke of what it takes to become one of the guards and debunked many of the urban legends surrounding that duty. (They do not have to give up tobacco and alcohol for the rest of their lives and they were given the option of remaining on duty during the hurricanes, not commanded to stand down.)



**Chuck Austin—Guard at the  
Tomb of the Unknown Soldier**



**Lt. Col. Bob Pearce is  
Squadron 5's first Senior  
Member of the Year.**

It was a warm evening, but much enjoyed by all.



**Capt. Daley takes the podium  
to honor Officer of the Year  
Capt. Jon Stokes**



**Lt. Col. Spiller —  
Chaplain of the Year**



**Capt. Stokes recites the accomplishments of Pilot of the Year, Lt. Col. Jerry Jones**



**Capt. Stokes salutes Observer of the Year, Lt. Col. Norma Edwards**

## GPS - continued from page 5 ...

***DoD has plans to improve integrity monitoring by adding satellite-to-satellite links, but this will not happen until the satellites are replaced.***

reason for this is that there are not enough monitoring stations checking the satellites world-wide and it lacks the means to send the message from satellite to satellite until they all have the information about a bad satellite, which in turn is sent to the receivers. Only when the satellite is overhead a monitoring station can they upload it. In essence, the GPS users will not know, early enough when a satellite has a unplanned failure or error.

DoD has plans to improve integrity monitoring by adding satellite-to-satellite data links, but this will only take place when all the satellite are replaced at the end of their lives which takes 8- 10 years after the older satellite was injected into orbit.

How does the FAA WAAS solve these problems? The FAA will be in control of WAAS and has placed

monitoring stations across the US. It has also leased time on geo-synchronous satellites that will transmit GPS signals. These GEO satellites will provide position like the other GPS satellites, except they don't move like the others. The GEOs will also be the means to disseminate the integrity/health status and provide differential corrections for each satellite. The differential information will improve system accuracy by removing GPS errors. In the future, GPS precision approaches will be good for Category I precision approaches with a minima of 200 feet or better. The integrity monitoring will allow GPS WAAS capable receivers to navigate in the National Airspace System (NAS) as a sole means of navigation and to serve as a precision approach sensor. Previously, GPS was only allowed as a supplemental

means of navigation for VFR only. Some IFR GPS receivers could fly instruments but needed a Receiver Autonomous Integrity Monitoring (RAIM) built-in, for IFR enroute and terminal navigation. IFR approach capable GPS receivers needed barometric sensors in-addition the standard IFR GPS and still had large approach minima's for non-precision approaches.

Additional information will be presented in the next AE presentation in order to further expand our knowledge of WAAS and its impact on current and future IFR approach capability. Furthermore, I will introduce Local Area Augmentation System (LAAS), (SCAT I) special category I approaches and differential GPS. I will also discuss what WAAS capabilities are present today and which GPS receivers support an upgrade.



*All Squadron 5  
Awardees are  
nominated for Group 3  
Awards*

## PERSONNEL UPDATES

Since April 1, 2006

### 2006 Squadron 5 Awards

Sr. Member of the Year  
Lt. Col. Bob Pearce

Officer of the Year  
Capt. Jon Stokes

Pilot of the Year  
Lt. Col. Jerry Jones

Observer of the Year  
Lt. Col. Norma Edwards

Chaplain of the Year  
Lt. Col. Tim Spiller

AE Officer of the Year  
1 Lt. Kevin Strange

PAO of the Year  
Capt. Jim Daley

### Mission Pilot Rating

Major Dan Olson

### ROA A-CUT

Capt. Ronald Kravetz

### Promotions

Craig Gallagher - Maj.  
Michael Graham - 2nd Lt.

**CONGRATULATIONS !!**



**Commander Stokes and DC Daley  
change Craig Gallagher's epaulets  
from Captain to Major**



**Lt. Col. Jones, Capt. Olfert, Lt. Col. Edwards, Maj. Gallagher and Lt. Mohr receive  
ribbons for various mission activities at the Dining Out.**